

Herschel Cryo System and Status of European Cooler Development

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The Herschel/Planck mission of the ESA Horizon 2000 Science Program accommodates two spacecrafts for a joined launch on Ariane 5 in 2007. The Herschel payload consists in three instruments built by international scientific consortia, HIFI (Heterodyne Instrument for FIRST), PACS (Photoconductor Array Camera and Spectrometer) and SPIRE (Spectral and Photometric Imaging Receiver). The spacecraft provides the environment for astronomical observations in the infrared and sub-millimeter wavelength range requiring cryogenic temperatures for the cold focal plane units. A key requirement for the bolometric detectors, used in PACS and SPIRE, is that they will have to be cooled down to 290 mK. This will be achieved by two ^3He adsorption coolers for which CEA-SBT is responsible. These sub-Kelvin sorption coolers provide a wide range of heat lift capability at temperature below 400 mK. Helium adsorption coolers rely on the capability of porous materials to adsorb or release a gas when cyclically cooled or heated. Using this physical process one can design a compressor/pump which, by managing the gas pressure in a closed system, can condense liquid at some appropriate location, and then perform an evaporative pumping on the liquid bath to reduce its temperature. Various coolers and components have been designed and flown using this technology. This presentation will focus on these cryogenic systems. Additionally a brief overview of the on going Sub 4 K developments in Europe will be given.